OBJECTION TO DRAWING. The Examiner contends that FIG. 1 should be labelled "Prior Art". However, it is believed that this requirement is in error. The portion of FIG. 1 which encompasses the invention is, inter alia, control section 160 and data processing section 170. These components have functions which are not in the prior art. Description of the components and the functions which are different from the prior art, starts at Page 6, line 1 through page 12, line 28.

As discussed in the MPEP 608.2(g), the objection should be given "... ONLY that which is old is illustrated..". In the instant case, FIG. 1 does not contain ONLY the prior art; in point of fact, the functions of components 160 and 170 are the invention, and are novel and unobvious... that is the invention.

Thus, it is believed that the objection is not applicable and should be withdrawn. Accordingly, applicant respectfully requests withdrawal of the requirement.

SECTION 102 REJECTION OVER KANAYAMA WITHOUT FOUNDATION

In view of the new claims, it is believed that Kanayama no longer "anticipates" our invention under section 102. Note, in our invention we "predict a specific absorption rate", thenn "compare the predicted SAR with a predetermined limit of a standard specific absorption rate" and then "adjust at lease one among number of pulses, pulse waveform and pulse width" of RF pulses so as to bring the SAR into the "predetermined limits".

Kanayama does not nod this. His disclosure is not concerned with predicting, comparing and adjusting so as to bring the SAR

to be within a limit. We do this to enable us to prevent the decrease in slices and thereby improve imaging efficiency.

In contrast, the cited reference Kanayama uses a simulated set of parameters to interactively control generation of a desired sequence of pulses. This has nothing to do with the problem caused by the SAR caused by RF pulses to be outside certain limits which causes reduction of slices in an imaging procedure.

Clearly, there is no "anticipation" under 102 by Kanayama.

SECTION 103 REJECTIONS IN FURTHER VIEW OF PAULY AND MOONEN TRAVERSED

The Section 103 rejections over Kanayama in view of Pauly and/or Mooney are respectfully traversed. The primary reference Kanayama clearly does not teach or make obvious the "predicting" of the Sars, "comparing" of the Sars" and the "adjusting of the RF number, or waveform or width, to cause the Sars to be within a"predetermined limit". Moroever, neither Pauly, nor Mooney, teaches these three steps in combination as recited in our claims. Furthermore, no combination of the primary and secondary references teaches or makes obvious the recited invention.

Our invention is completely different from the cited references in function, objectives and operational steps. No extension of the cited references singly or in combination would make obvious our recited invention.

In contrast, Pauly merely teaches modification of a Shinnar-LeRoux waveform to a sync waveform. But, nothing is mentioned or even suggested of the three steps above discussed.

In further contrast, Moonen merely teaches use of a Hamming

filter. But, there is nothing at all discussed about the the other three steps set forth in the above discussion of our recited invention.

In view of the foregoing , clearly, no Section 103 rejection would be supportable by the combinationof Kanayama, Pauly and/or Moonen, and hence, the Section 103 rejections should be withdrawn, especially in view of our new claims.

The inventor wishes to make the following technical comments: "The block of "pulse sequence adjustment" of FIG. 2 of USP 5,519, 320 may appear to be similar to our invention. The description at col. 9, lines 31-43 relates to SAR (Specific Absorption Rate). The object of USP 5,519,320 is to perform a pre-scan during the shortest time by selecting the most suitable RF pulses in several kinds of stored RF pulses which were measured in advance, based on RF power condition"

"In contrast, our invention DOES NOT STORE RF PULSES corresponding to RF power conditions. The object of our invetnion is not to perform a pre-scan during the shortest time. Our object is to adjust RF pulse(waveform),time of applying RF pulse, number of RF pulse etc, continuously (without the stored , discrete RF waveforms), automatically so that measured or calculated SAR value does not exceed legal SAR limit value, and to use the SAR value even when it is closest to the limit value. Thus, the objecttof our invention is completely different from the object of 5,519,320."

"Also, the disclosures of USPs 5,280,245 and 5,570,019 are directed to ways of reducing SAR value by using determined RF pulses mainly. In contrast our invention does not utilize such ways."

"I think that our invention as described at page 8, line 15 to page 12, line 17 (i.e. Figs 5-10), especially FIG. 10, is NOT DISCLOSED or made obvious by any combination of the three cited patents."

In view of the foregoing, allowance is respectfully solicited.

Respectfully

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5 Dec 03

Claims 1-15, (cancelled)

Claim 16, (previously cancelled)

Claim 17, (cancelled)

18.(new) A spin excitation method for exciting spins within an object to be imaged by a pulse sequence containing RF pulses, said method comprising the steps of:

predicting a specific absorption rate of said object to be imaged in executing said pulse sequence;

comparing said predicted specific absorption rate with a predetermined limit of a standard specific absorption rate ; and

adjusting at least one among number of pulses, pulse waveform and pulse width of said RF pulses in said pulse sequence so that said predicted specific absorption rate value is within said predetermined limit, and thereby prevent reduction of slices during a repetition time period and improve imaging efficiency.

19.(new) The method of claim 18, wherein said RF pulses to be adjusted are 180° pulses.

20.(new) The method of claim 18, wherein adjustment of pulse waveform is provided by modification from a Shinnar-LeRoux pulse waveform to a sinc pulse waveform.

21. (new) The method of claim 18, wherein adjustment of pulse waveform is provided by modification from an SLR pulse waveform to a waveform obtained by filtering said SLR pulse waveform.

22. (new) The method of claim 21, wherein said filtering is done by use of a Hamming filter.

23.(new) A spin excitation apparatus for exciting spins within an object to be imaged by a pulse sequence containing RF pulses, said apparatus comprising:

means for predicting a specific absorption rate of said object to be imaged in executing said pulse sequences;

means for comparing said predicted specific absorption rate with a predetermined limit of a standard specific absorption rate; and

means for adjusting at least one among number of pulses, pulse waveform and pulse width of said RF pulses in said pulse sequence so that said predicted specific absorption rate value is within said predetermined limit, and thereby prevent reduction of slices during a repetition time period and improve imaging efficiency.

24.(new) The apparatus of claim 23, wherein said means for adjusting comprises means for adjusting 180^{o} RF pulses.

25.(new) The apparatus of claim 23, wherein said means for adjusting comprises means for adjusting pulse waveform by modifying a Shinnar-LeRoux pulse waveform to a sinc pulse waveform.

26.(new) The apparatus of claim 23, wherein said means for adjusting comprises means for adjusting pulse waveform by modifying an SLR pulse waveform to a waveform obtained by filtering said SLR pulse waveform.

27.(new) The apparatus of claim 26, wherein said means for adjusting further comprises means for filtering including a Hamming filter.

28. (new) A magnetic resonance imaging apparatus comprising:

means for generating a static magnetic field in a space containing an object to be imaged;

means for generating a gradient magnetic field in said space;

means for transmitting an RF excitation signal to said space;

means for receiving a magnetic resonance signal from said space; and

means for producing an image based on said received magnetic resonance signal, wherein

said means for transmitting includes a spin excitation apparatus for exciting spins within said object to be imaged by a pulse sequence containing RF pulses, said excitation apparatus comprising:

means for predicting a specific absorption rate of said object to be imaged in executing said pulse sequence;

means for comparing said predicted specific absorption rate with a predetermined limit of a standard specific absorption rate; and

means for adjusting at least one among number of pulses, pulse waveform and pulse width of said RF pulses in said pulse sequence so that said predicted specific absorption rate value is within said predetermined limit, and thereby prevent reduction of slices during a repetition time period and improve imaging efficiency.

29. (new) The apparatus of claim 28, wherein said means for adjusting comprises means for adjusting 180^{o} RF pulses.

30. (new) The apparatus of claim 28, wherein said means for adjusting comprises means for adjusting pulse waveform by modifying a Shinnar-LeRoux pulse waveform to a sinc pulse waveform.

31.(new) The apparatus of claim 28, wherein said means for adjusting comprises means for adjusting pulse waveform by modifying an SLR pulse waveform to a waveform obtained by filtering said SLR pulse waveform.

32.(new) The apparatus of claim 31, wherein said means for adjusting further comprises means for filtering including a Hamming filter.

33. (new) A magnetic resonance imaging method comprising the steps of:

generating a static magnetic field in a space containing an object to be imaged;

generating a gradient magnetic field in said space;

transmitting an RF excitation signal to said space;

receiving a magnetic resonace signal from said space; and

producing an image based on said received magnetic resonance signal; wherein

said transmitting step includes a spin excitation method for exciting spins within said object to be imaged by a pulse sequence containing RF pulses, said spin excitation method comprising the steps of:

predicting a specific absorption rate of said object to be imaged in executing said pulse sequence;

comparing said predicted specific absorption rate with a predetermined limit of a standard specific absorption rate ; and

adjusting at lease one among number of pulses, pulse waveform and pulse width of said RF pulses in said pulse sequence so that said predicted specific absorption rate value is within said predetermined limit, and thereby prevent reduction of slices during repetition time period and improve imaging efficiency.

34. (new) The method of claim 33, wherein said RF pulses to be adjusted are 180° RF pulses.

35.(new) The method of claim 33, wherein adjustment of pulse waveform is provided by modification from a Shinnar-LeRoux pulse waveform to a sinc pulse waveform.

36. (new) The method of claim 33, wherein adjustment of pulse waveform is provided by modification from an SLR pulse waveform to a waveform obtained by filtering said SLR pulse waveform.

37. (new) The method of claim 36, wherein said filtering is done by use of a Hamming filter.